REMARKS/ARGUMENTS

Re-examination and favorable reconsideration in light of the above amendments and the following comments are respectfully requested.

Claims 20 - 27 and 30 - 32 are pending in the application. Currently, no claim stands allowed.

In the office action mailed May 4, 2005, claims 20 - 32 were rejected under 35 U.S.C. 103(a) as being unpatentable over Wojciehowski et al. in view of Schafer et al.; and claims 26, 27, 30, and 31 were rejected under 35 U.S.C. 103(a) as being unpatentable over Wojciehowski et al. in view of Schafer et al. and further in view of Applicants' alleged admitted prior art.

The foregoing rejections are traversed by the instant response.

The present invention is directed to a hybrid mechanical/pneumatic accessory drive system which simultaneously allows for reduced mechanical shaft power load and systems capacity to absorb and utilize the energy of compressor bleed air at low power. The system of the present invention improves engine transient operation. In the system of the present invention, the engine mounted power generation system may operate solely with mechanical power at normal steady state operating conditions and combination pneumatic and mechanical power during a transient state. As used in this invention, the term "transient state" refers to any change in power demand whether it be a change in engine power demand due to a change in engine state or a change in any mechanical or electrical power demand due to a change in accessory state. By opening a compressor bleed during a transient state or at any other operating point, the operating line can be lowered, increasing the stall margin (point B in FIG. 1). The bleed air is directed to a pneumatically operated device which reduces demand for

mechanical shaft power from the high pressure rotor of the gas turbine engine. Reducing mechanical power demand lowers the compressor operating line, further allowing a given transient excursion with improved stall margin as shown by line 18 in FIG. 1. The prior art cited and applied by the Examiner in rejecting the claims fails to teach or suggest the hybrid mechanical/pneumatic accessory drive system of the present invention.

With respect to the rejection of claims 20 - 25 and 32 on obviousness grounds, Applicants offer the following comments about the references. The Wojciehowski et al. reference relied upon by the Examiner broadly describes a means of powering an aircraft spraying system's pumping element with only pneumatic power provided by the main propulsion engine. Previous designs had featured elements that "…developed power for the liquid spraying systems independent of the engines through a propeller or fan separately exposed to the surrounding airstream." The purpose of the invention in this patent is "to minimize parasitic load on the aircraft as well as to provide excellent controllability of the rate of spray…." It alternatively mentions earlier "… in order to minimize parasitic loads upon the aircraft propulsion engine …." First, the previous designs minimized parasitic load on the engine and improved parasitic drag load on the airplane as described in the second paragraph of the background section. The Wojciehowski et al. system actually increases parasitic load on the engine and minimizes parasitic drag load on the airplane itself by comparison to referenced previous designs. This point is relevant in that the present invention makes no claim about minimizing parasitic power extraction to either the airframe or the engine.

Second, the Wojciehowski et al. system only describes a means to pneumatically drive parasitic load devices (here only

described as a liquid pump). Two pertinent points are as follows. Similar systems have been used for a considerable period of time on commercial aircraft, where engine pneumatic bleed power is used to power what are commonly known as air driven hydraulic pumps. These are used intermittently throughout flight such as in the case of landing gear retraction and extension. This leads to the conclusion that the Wojciehowski et al. system applies specifically to "... agricultural aircraft for spraying of fields and for fire fighting purposes" as described in the background of the reference. There is no mention in Wojciehowski et al. of alternative engine driven means of pump power extraction such as mechanical shaft power or electrical power as a consideration for optimizing the efficiency of the extracted parasitic load. The basic consideration of the Wojciehowski et al, invention is that the engine derived pneumatic power system is a more efficient energy conversion system during periods of high power demand than previously mentioned designs.

The present invention is directed to two key elements not addressed in the Wojciehowski et al. reference. The first is the hybrid nature of the design, simultaneously using engine mechanical shaft and pneumatic power to drive a variety of engine mounted parasitic load devices including fuel pumps, oil pumps, hydraulic pumps, and electrical generators. The reasoning behind the simultaneous use of these two power sources is to actively control the surge margin of the high pressure compressor through the FADEC functions by alternating demand for each source. The present invention focuses on the combined effect of reducing the high compressor operating line by extracting pneumatic bleed power (which moves the operating line away from the surge line) while increasing the surge line (away from the operating line) by reducing the mechanical power demand

by the available pneumatic power from the bleed - thus, the hybrid nature of the present invention.

The second important distinction is that the present invention makes no claim of minimizing the parasitic load on either the engine or the airframe. The parasitic load is a function of combined airplane and engine demand for parasitic power, particularly in the low power regime of engine operation (as opposed to the power demand described in the claimed invention). In fact in certain operating regimes including high power operation of multi-spooled gas turbine engines, pure mechanical shaft power extraction is in fact the most efficient power source for parasitic loads, which the system of the present invention provides for as opposed to the reference's pneumatic only source.

As noted in Applicants' previous response, the Wojciehowski et al. system does not have any means for monitoring at least one parameter which provides information about an incipient change in power demand and means for supplying bleed air from the engine during a transient state *in response to said at least one monitored parameter*. The point which the Examiner seems to miss is that there is absolutely no reason or need to provide Wojciehowski et al.'s system with either of the claimed means. Such means serve no benefit in the Wojciehowski et al. system.

The Examiner attempts to piece an obviousness rejection together through the citation of the Schafer et al. patent. However, this patchwork rejection fails for a number of reasons. First, the Schafer et al. patent merely describes the function of a modern FADEC engine control system function in the *post surge recovery regime*. The Schafer et al. patent does not teach or suggest how one would use a FADEC during normal engine operation, which is by definition prior to surge. Second, there is absolutely no reason why one of ordinary skill in the art

would be motivated to include a FADEC such as Schafer et al.'s system in Wojciehowski et al.'s system. The FADEC serves absolutely no purpose with regard to the operation of the liquid spraying system that Wojciehowski et al. focus on. With regard to the Examiner's statement that it would be obvious to modify Wojciehowski et al. by Shafer et al to safely and efficiently generate power to operate the aircraft equipment, even if this statement were true, there still is no teaching or suggestion in the references of any means for monitoring at least one parameter which provides information about an incipient change in power demand and means for supplying bleed air from the engine during a transient state *in response to said at least one monitored parameter*. No such means is discussed in either of the cited and applied references. is wrong.

Claims 21 - 25 and 32 are allowable for the same reasons as claim 20 as well as on their own accord. For example, neither reference teaches or suggests a control valve which is opened or modulated by a signal from the electronic engine control device as set forth in claim 23, which valve is used to supply bleed air to a pneumatically operated means (claim 24). Claim 25 is allowable because neither reference teaches or suggests a feedback loop for transmitting a signal to the electronic control device representative of control valve position. Claim 32 is allowable because the pneumatically operated means in Wojciehowski et al. is a pneumatic motor which is completely independent of engine operation. Its use has no effect on all engine operation. Thus, the pneumatically operated means in Wojciehowski et al. will not in any way increase the amount of stall margin available to a high pressure compressor of the engine. With regard to the inherency argument made by the Examiner in connection with claim 32, the Examiner has no presented any convincing line of reasoning as to why this is the

case. There is absolutely no reason why the pneumatically operated means in Wojciehowski et al. increases the amount of stall margin available to a high pressure compressor of the engine.

For these reasons, the rejection of claims 20 - 25 and 32 should be withdrawn.

With regard to the rejection of claims 26, 27, 30, and 31, this rejection too is ill conceived. First, the only thing that the Examiner has shown is that certain individual claimed features by themselves are old in the art. Something being old in the art is not a sufficient basis to form an obviousness rejection. More is needed - a teaching, a suggestion, or motivation which flows from the references. See *In re Rouffet*, 47 USPQ2d 1453, 1457 - 58 (Fed. Cir. 1988). There is absolutely no reason to provide Wojciehowski et al. system with the pneumatically integrated generator of claims 26 and 27 and/or the turbine connected to the gearbox and the generator driven by the air turbine of claim 30 and/or the air turbine and generator driven by the air turbine of claim 31. None of these claimed features are needed to operate or improve the operation of the liquid spraying system of Wojciehowski et al. In fact, they would serve no purpose with regard to the operation of the liquid spraying system. For these reasons, claims 26, 27, 30, and 31 are clearly allowable over the cited and applied references.

The Examiner's response to the arguments on pages 3 - 5 is duly noted. The Examiner's arguments show the hindsight nature of the rejections of record. Schafer et al. as noted above relates to post surge events. The whole purpose of the present invention is to monitor at least one parameter which provides information about an incipient change in power demand and for supplying bleed air from the engine during a transient state in

response to the at least one monitored parameter - something that is not considered in Schafer et al. The Examiner argues that the incipient change in power demand is the state of the control element 16. Even if this is true, the claim calls for monitoring at least one parameter which provides information about an incipient change in power demand. Schafer et al, never says that it is monitoring the state of control element 16. The Examiner's argument is the best evidence of the hindsight nature of the rejection and the Examiner, using the blueprint provided by Applicants, to reject the references. The Examiner's comment about him not suggesting using Schafer et al.'s system directly into Wojciehowski's system is taken as a recognition that Schafer et al. can not be combined with the primary reference and does not teach or suggest the claimed invention. The Examiner's comments about claims 23 and 25 make no sense. The Examiner does not explain where there is any teaching of modifying the control valve in Wojciehowski et al. so that it is opened or modulated by a signal from the electronic engine control device. Certainly, neither reference teaches or suggests such a modification. The Examiner also does not explain where there is any teaching of a feedback loop for transmitting a signal to the electronic engine control device representative of control valve position. Certainly, Schafer et al., even if it has a feedback loop, contains no such teaching. Finally, with respect to the Examiner's comments about claims 26, 27, 30 and 31, the mere fact that things in the prior art could be used in a prior art system does not establish obviousness absent some teaching, suggestion or motivation to do so. Applicant acknowledges that none of the pneumatic means need to be used to operate the liquid spraying system. Given the fact, there is no reason why one of ordinary skill in the art would be motivated to incorporate them into Wojciehowski et al.

For the foregoing reasons, the instant application is believed to be in condition for allowance. Such allowance is respectfully solicited.

Should the Examiner believe an additional amendment is needed to place the case in condition for allowance, he is hereby invited to contact Applicants' attorney at the telephone number listed below.

A Notice of Appeal is enclosed herewith. Also enclosed is a check in the amount of $500.00 to cover the cost of the Notice of Appeal fee. Should the Director determine that an additional fee is due, he is hereby authorized to charge said additional fee to Deposit Account No. 02-0184.

Respectfully submitted,

Timothy M. Morris et al.

By _____

George A. Coury
BACHMAN & LaPOINTE, P.C.
Reg. No. 34,309
Attorney for Applicants

Telephone: (203)777-6628
Telefax: (203)865-0297
Email: docket@bachlap.com

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I, Nicole Motzer, hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313" on **August 2, 2005.**

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